

Operating Instructions

Radar sensor for continuous level
measurement of water and wastewater

VEGAPULS WL 61

Profibus PA



Document ID: 38062



VEGA

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**Safety instructions for Ex areas**

Please note the Ex-specific safety information for installation and operation in Ex areas. These safety instructions are part of the operating instructions manual and come with the Ex-approved instruments.

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1 About this document

1.1 Function

This operating instructions manual provides all the information you need for mounting, connection and setup as well as important instructions for maintenance and fault rectification. Please read this information before putting the instrument into operation and keep this manual accessible in the immediate vicinity of the device.

1.2 Target group

This operating instructions manual is directed to trained specialist personnel. The contents of this manual should be made available to these personnel and put into practice by them.

1.3 Symbols used



Information, tip, note

This symbol indicates helpful additional information.



Caution: If this warning is ignored, faults or malfunctions can result.



Warning: If this warning is ignored, injury to persons and/or serious damage to the instrument can result.



Danger: If this warning is ignored, serious injury to persons and/or destruction of the instrument can result.



Ex applications

This symbol indicates special instructions for Ex applications.



List

The dot set in front indicates a list with no implied sequence.



Action

This arrow indicates a single action.



Sequence of actions

Numbers set in front indicate successive steps in a procedure.



Battery disposal

This symbol indicates special information about the disposal of batteries and accumulators.

2 For your safety

2.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

2.2 Appropriate use

VEGAPULS WL 61 is a sensor for continuous level measurement.

You can find detailed information about the area of application in chapter "*Product description*".

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

2.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

2.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

Depending on the instrument version, the emitting frequencies are in the C or K band range. The low emitting frequencies are far below the internationally approved limit values. When used correctly, there is no danger to health.

2.5 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of our homepage.

2.6 NAMUR recommendations

NAMUR is the automation technology user association in the process industry in Germany. The published NAMUR recommendations are accepted as the standard in field instrumentation.

The device fulfills the requirements of the following NAMUR recommendations:

- NE 43 – Signal level for malfunction information from measuring transducers
- NE 53 – Compatibility of field devices and display/adjustment components
- NE 107 - Self-monitoring and diagnosis of field devices

For further information see www.namur.de.

2.7 Radio license for Europe

The instrument meets the LPR (Level Probing Radar) radio standard EN 302729-1/2.

It is approved for unrestricted use inside and outside of closed vessels in countries of the EU and EFTA that have implemented this standard:

Austria, Belgium, Bulgaria, Germany, Denmark, Estonia, France, Greece, Great Britain, Ireland, Island, Italy, Liechtenstein, Lithuania, Latvia, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Sweden, Switzerland, Slovakia, Slovenia, Spain, Czech Republik and Cyprus.

Not included in the CE conformity declaration are the countries Finland and Hungary implementing this radio standard at a later date.

For operation outside of closed vessels, the following conditions must be fulfilled:

- The installation must be carried out by trained qualified personnel
- The instrument must be stationary mounted and the antenna directed vertically downward
- The mounting location must be at least 4 km away from the radio astronomy stations, unless special permission was granted by the responsible national approval authority
- When installed within 4 to 40 km of a radio astronomy station, the instrument must not be mounted higher than 15 m above the ground.

You can find a list with the respective radio astronomy stations in chapter "Supplement".

2.8 Radio license for USA/Canada

The instrument is in conformity with part 15 of the FCC regulations.

Operation is subject to the following two conditions:

- this device may not cause harmful interference, and
- this device must accept any interference received, including interference that may cause undesired operation.
- the antenna must be directed vertically downward

FCC requirements limit this device to be used only in a fixed installation, never in a portable installation or in installations that are in motion (i.e. cement trucks, etc.).

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

This device complies with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions:

- this device may not cause interference, and
- this device must accept any interference, including interference that may cause undesired operation of the device

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

- l'appareil ne doit pas produire de brouillage , et
- l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

2.9 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

3 Product description

3.1 Configuration

Type label

The type label contains the most important data for identification and use of the instrument:

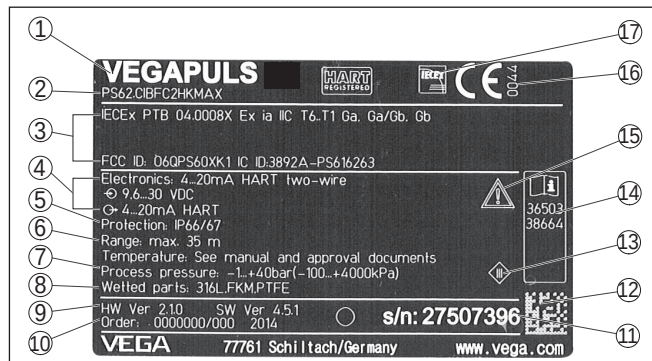


Fig. 1: Layout of the type label (example)

- 1 Instrument type
- 2 Product code
- 3 Approvals
- 4 Power supply and signal output, electronics
- 5 Protection rating
- 6 Measuring range
- 7 Process and ambient temperature, process pressure
- 8 Material, wetted parts
- 9 Hardware and software version
- 10 Order number
- 11 Serial number of the instrument
- 12 Data-Matrix-Code for Smartphone-App
- 13 Symbol of the device protection class
- 14 ID numbers, instrument documentation
- 15 Reminder to observe the instrument documentation
- 16 Notified authority for CE marking
- 17 Approval directive

Serial number - Instrument search

The type label contains the serial number of the instrument. With it you can find the following instrument data on our homepage:

- Product code (HTML)
- Delivery date (HTML)
- Order-specific instrument features (HTML)
- Operating instructions and quick setup guide at the time of shipment (PDF)
- Order-specific sensor data for an electronics exchange (XML)
- Test certificate (PDF) - optional

Go to www.vega.com, "VEGA Tools" and "Instrument search". Enter the serial number.

Alternatively, you can access the data via your smartphone:

- Download the smartphone app "VEGA Tools" from the "Apple App Store" or the "Google Play Store"
- Scan the Data Matrix code on the type label of the instrument or
- Enter the serial number manually in the app

Scope of this operating instructions manual

This operating instructions manual applies to the following instrument versions:

- Hardware from 1.0.0
- Software from 4.4.0

Scope of delivery

The scope of delivery encompasses:

- Radar sensor
- Optional mounting accessory
- Documentation
 - Quick setup guide VEGAPULS WL 61
 - Instructions for optional instrument features
 - Ex-specific "Safety instructions" (with Ex versions)
 - if necessary, further certificates
- DVD "Software & Documents", containing
 - Operating instructions
 - Safety instructions
 - PACTware/DTM-Collection
 - Driver software



Information:

In the operating instructions manual, the optional instrument features are described. The respective scope of delivery results from the order specification.

3.2 Principle of operation

Application area

The radar sensor VEGAPULS WL 61 is the ideal sensor for all applications in the water and waste water industry. It is particularly suitable for level measurement in water treatment, in pump stations as well as storm water overflow tanks, for flow measurement in open flumes and for gauge measurement.

Functional principle

The antenna of the radar sensor emits short radar pulses with a duration of approx. 1 ns. These pulses are reflected by the product and received by the antenna as echoes. The transit time of the radar pulses from emission to reception is proportional to the distance and hence to the level. The determined level is converted into an appropriate output signal and outputted as measured value.

3.3 Packaging, transport and storage

Packaging

Your instrument was protected by packaging during transport. Its capacity to handle normal loads during transport is assured by a test based on ISO 4180.

The packaging of standard instruments consists of environment-friendly, recyclable cardboard. For special versions, PE foam or PE

foil is also used. Dispose of the packaging material via specialised recycling companies.

Transport

Transport must be carried out in due consideration of the notes on the transport packaging. Nonobservance of these instructions can cause damage to the device.

Transport inspection

The delivery must be checked for completeness and possible transit damage immediately at receipt. Ascertained transit damage or concealed defects must be appropriately dealt with.

Storage

Up to the time of installation, the packages must be left closed and stored according to the orientation and storage markings on the outside.

Unless otherwise indicated, the packages must be stored only under the following conditions:

- Not in the open
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration

Storage and transport temperature

- Storage and transport temperature see chapter "*Supplement - Technical data - Ambient conditions*"
- Relative humidity 20 ... 85 %

4 Mounting

4.1 General instructions

Suitability for the process conditions

Make sure that all parts of the instrument exposed to the process are suitable for the existing process conditions.

These are mainly:

- Active measuring component
- Process fitting
- Process seal

Process conditions are particularly:

- Process pressure
- Process temperature
- Chemical properties of the medium
- Abrasion and mechanical influences

You can find the specifications of the process conditions in chapter "Technical data" as well as on the type label.

Straining clamp

4.2 Mounting versions

Most simply mount the instrument via the straining clamp. For this purpose, the connection cable is provided with a strain relief wire of Kevlar.

In order to avoid faulty measured values, make sure that the sensor does not oscillate.

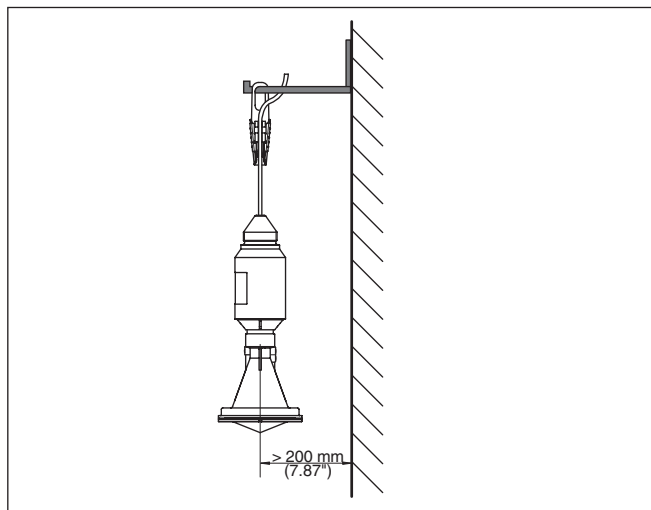


Fig. 2: Mounting via a straining clamp

Mounting bracket

For a rigid mounting, a mounting bracket with opening for thread G1½, e.g. from the VEGA product range, is recommended. The mounting of the sensor in the bracket is carried out via a G1½ counter

nut of plastic. Take note of chapter "*Mounting instructions*" for the distance to the wall.

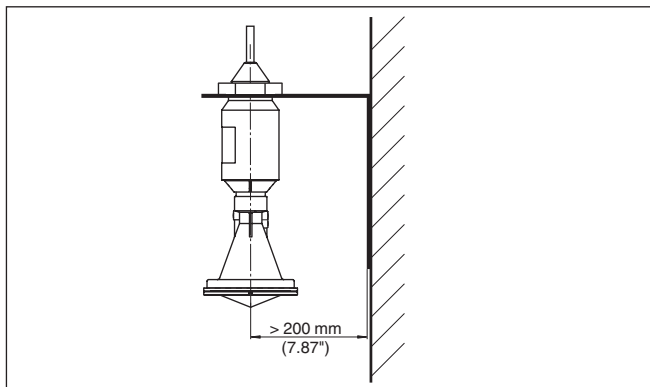


Fig. 3: Mounting via a mounting bracket

Mounting strap

The optional mounting strap enables sensor mounting on e.g. a ceiling, wall or bracket. It is available in the following versions:

- Length 300 mm for ceiling mounting
- Length 170 mm for wall mounting

Mounting strap - Ceiling mounting

The instrument is normally mounted with a strap vertically on the ceiling.

This ensures swivelling of the sensor up to 180° for optimum orientation.

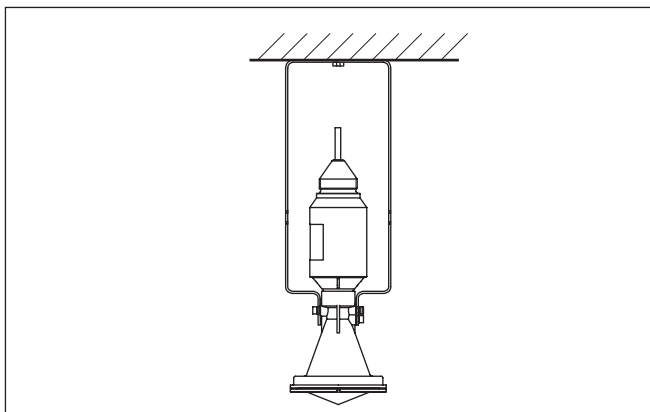


Fig. 4: Ceiling mounting via the mounting strap with length 300 mm

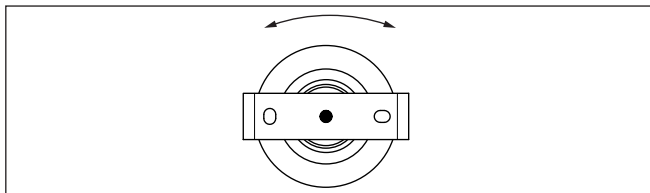


Fig. 5: Rotation in the centre with ceiling mounting

Mounting strap - Wall mounting

As an alternative the strap mounting is carried out horizontally or obliquely.

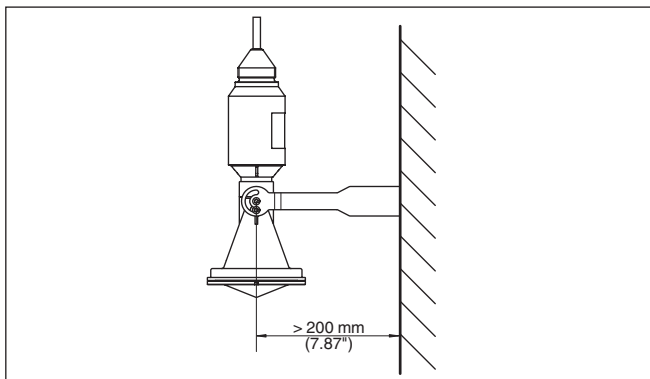


Fig. 6: Wall mounting via the mounting strap with length 170 mm

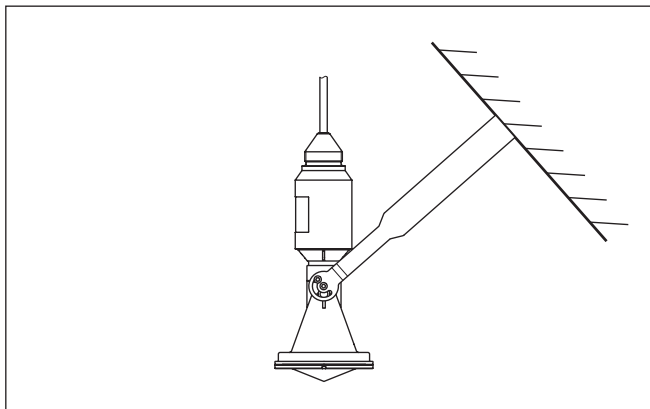


Fig. 7: Wall mounting with inclined wall via the mounting strap with length 300 mm

Flange mounting

For mounting the instrument on a socket or a manhole cover, an unassembled combi collar flange for DN 80 (ASME 3" or JIS 80) is optionally available also as retrofitting part.

You can find drawings of these mounting options in chapter "Dimensions".

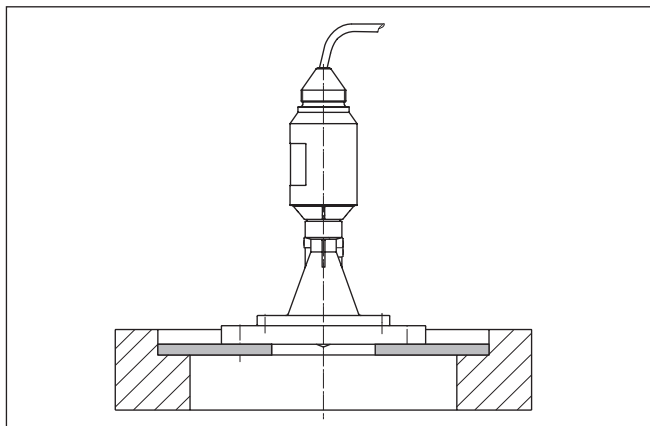


Fig. 8: Mounting by means of an adapter flange, for example, on a manhole lid.

4.3 Mounting preparations, mounting strap

The optional mounting strap is supplied unassembled. It must be screwed to the sensor before setup with the attached screws. Max. torque, see chapter "Technical data". Required tools: Allen wrench size 4.

There are two different variants of screwing the strap to the sensor. Depending on the selected variant, the sensor can be rotated in the strap infinitely variable through 180° or in three steps 0°, 90° and 180°.

4.4 Mounting instructions

For tight installation of the version with plastic horn antenna with compression or adapter flange, the following conditions must be fulfilled:

1. Use suitable flat seal, e.g. of EPDM with Shore hardness 25 or 50
2. Make sure the number of flange screws corresponds to the number of flange holes
3. Tighten all screws with the torque stated in the technical data

Tight installation of the plastic horn antenna

Polarisation

The emitted radar impulses of the radar sensor are electromagnetic waves. The polarisation is the direction of the electrical wave component. By turning the instrument in the connection flange or mounting strap, the polarisation can be used to reduce the effects of false echoes.

The position of the polarisation is marked by marking bars on the instrument.

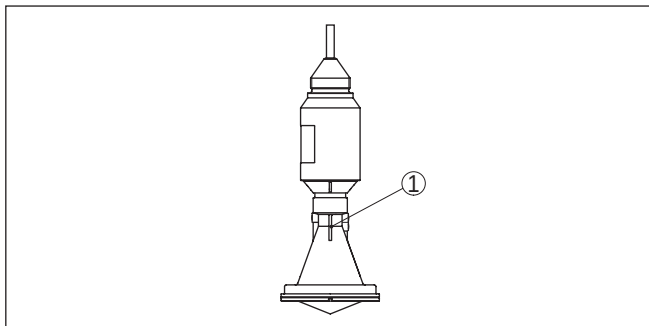


Fig. 9: Position of the polarisation

1 Marking bar

Installation position

When mounting the sensor, keep a distance of at least 200 mm (7.874 in) to the vessel wall. If the sensor is installed in the center of dished or round vessel tops, multiple echoes can arise. These can, however, be suppressed by an appropriate adjustment (see chapter "Setup").

If you cannot maintain this distance, you should carry out a false signal storage during setup. This applies particularly if buildup on the vessel wall is expected. In such a case, it is recommended to repeat the false signal storage at a later date with existing buildup.

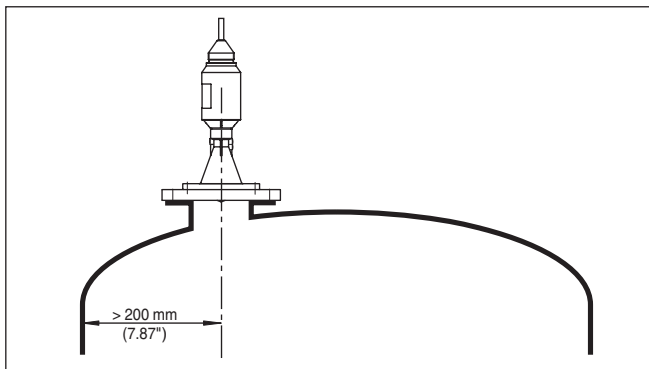


Fig. 10: Mounting of the radar sensor on round vessel tops

In vessels with conical bottom it can be advantageous to mount the sensor in the center of the vessel, as measurement is then possible down to the lowest point of the vessel bottom.

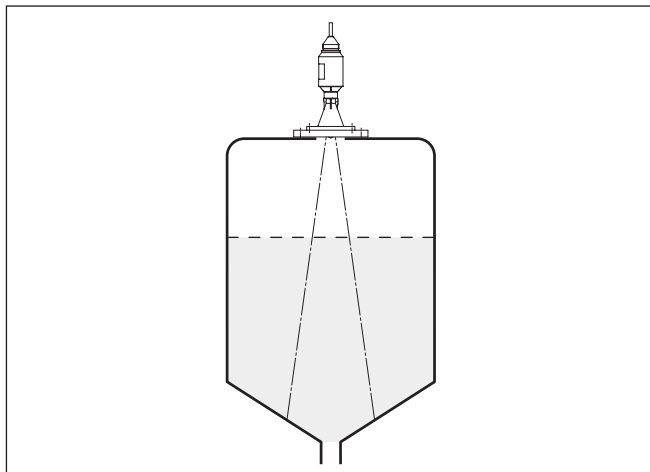


Fig. 11: Mounting of the radar sensor on vessels with conical bottom

Inflowing medium

Do not mount the instrument in or above the filling stream. Make sure that you detect the product surface, not the inflowing product.

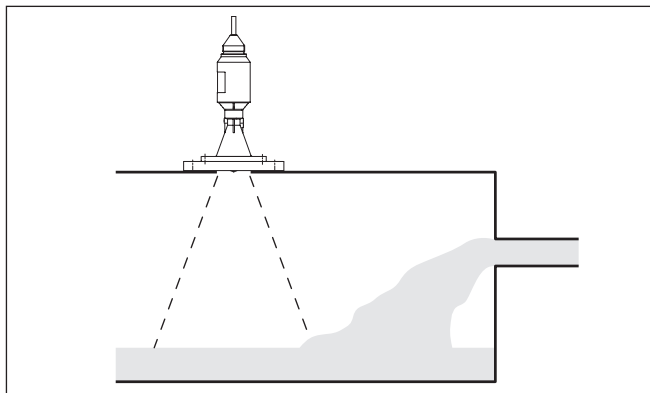


Fig. 12: Mounting of the radar sensor with inflowing medium

Socket

Approximate values of the socket heights are shown in the following illustration. The socket end should be smooth and burr-free, if possible also rounded. After mounting, you have to carry out a false signal memory during the parameter adjustment.

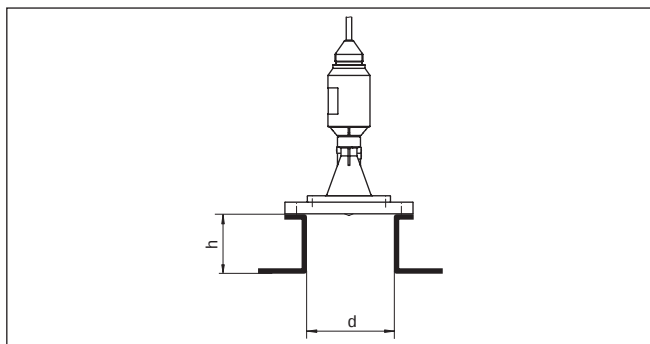


Fig. 13: Deviating socket dimensions

The below charts specify the max. socket piece length h depending on the diameter d .

Socket diameter d	Socket length h
80 mm	≤ 300 mm
100 mm	≤ 400 mm
150 mm	≤ 500 mm

Socket diameter d	Socket length h
3"	≤ 11.8 in
4"	≤ 15.8 in
6"	≤ 19.7 in

Sensor orientation

Direct the sensor as perpendicular as possible to the product surface to achieve optimum measurement results.

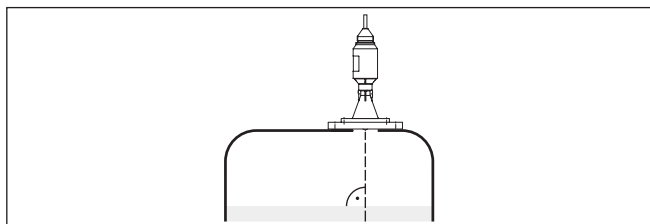


Fig. 14: Orientation of the sensor

Vessel installations

The mounting location of the radar sensor should be a place where no other equipment or fixtures cross the path of the microwave signals.

Vessel installations, such as e.g. ladders, limit switches, heating spirals, struts, etc., can cause false echoes and impair the useful echo. Make sure when planning your measuring site that the radar sensor has a "clear view" to the measured product.

In case of existing vessel installations, a false echo storage should be carried out during setup.

If large vessel installations such as struts or supports cause false echoes, these can be attenuated through supplementary measures. Small, inclined sheet metal baffles above the installations scatter the radar signals and prevent direct interfering reflections.



Fig. 15: Cover smooth profiles with deflectors

Foam generation

Through the action of filling, stirring and other processes in the vessel, compact foams that considerably damp the emitted signals may form on the product surface.

If foams are causing measurement errors, the biggest possible radar antennas, the electronics with increased sensitivity or low frequency radar sensors (C band) should be used.

As an alternative, sensors with guided microwave can be used. These are unaffected by foam generation and are best suited for such applications.

Flow measurement with rectangular flume

The short examples give you introductory information on the flow measurement. Detailed planning information is available from flume manufacturers and in special literature.

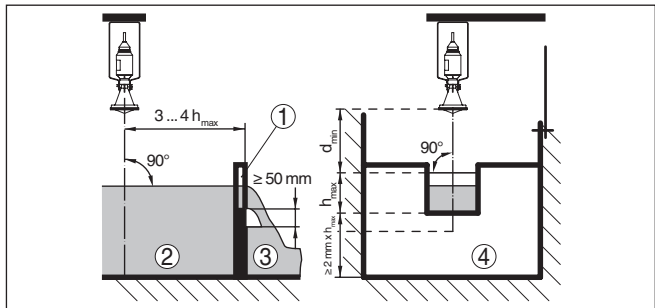


Fig. 16: Flow measurement with rectangular flume: $d_{\min}$ = min. distance of the sensor (see chapter "Technical data"); $h_{\max}$ = max. filling of the rectangular flume

- 1 Overflow orifice (side view)
- 2 Headwater
- 3 Tail water
- 4 Overfall orifice (view from bottom water)

In general, the following points must be observed:

- Install the sensor on the headwater side
- Installation in the centre of the flume and vertical to the liquid surface
- Distance to the overfall orifice

- Distance of orifice opening above ground
- Min. distance of the orifice opening to bottom water
- Min. distance of the sensor to max. storage level

Flow measurement with Khafagi Venturi flume

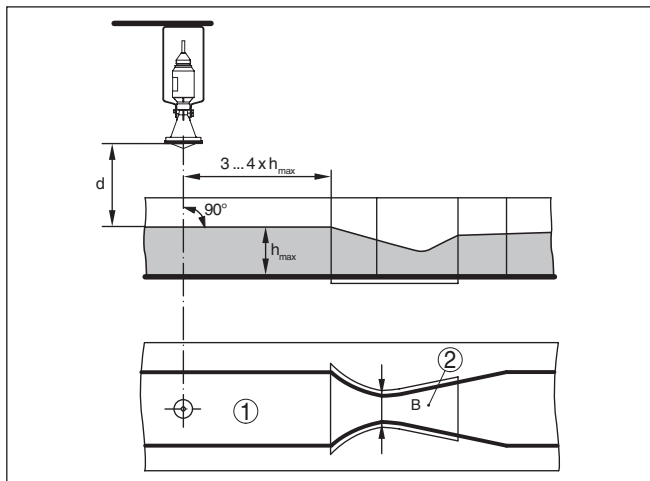


Fig. 17: Flow measurement with Khafagi-Venturi flume: d = Min. distance to sensor; h_{max} = max. filling of the flume; B = tightest constriction in the flume

1 Position sensor

2 Venturi flume

In general, the following points must be observed:

- Installation of the sensor at the input side
- Installation in the centre of the flume and vertical to the liquid surface
- Distance to the Venturi flume
- Min. distance of the sensor to max. storage level

5 Connecting to power supply

5.1 Preparing the connection

Safety instructions

Always keep in mind the following safety instructions:

- Connect only in the complete absence of line voltage
- If overvoltage surges are expected, overvoltage arresters should be installed

Voltage supply

Power supply and current signal are carried on the same two-wire cable. The operating voltage can differ depending on the instrument version.

The data for power supply are specified in chapter "*Technical data*".

Provide a reliable separation between the supply circuit and the mains circuits according to DIN EN 61140 VDE 0140-1.

Keep in mind the following additional factors that influence the operating voltage:

- Lower output voltage of the power supply unit under nominal load (e.g. with a sensor current of 20.5 mA or 22 mA in case of fault)
- Influence of additional instruments in the circuit (see load values in chapter "*Technical data*")

Connection cable

Connection is made with screened cable according to the Profibus specification. Power supply and digital bus signal are carried over the same two-wire connection cable.

Use cable with round cross section for instruments with housing and cable gland. To ensure the seal effect of the cable gland (IP protection rating), find out which cable outer diameter the cable gland is suitable for.

Use a cable gland fitting the cable diameter.

Please make sure that your installation is carried out according to the Profibus specification. In particular, make sure that the termination of the bus is done with appropriate terminating resistors.

You can find detailed information of the cable specification, installation and topology in the "*Profibus PA - User and Installation Guide-line*" on www.profibus.com.

5.2 Wiring plan

Wire assignment, connection cable

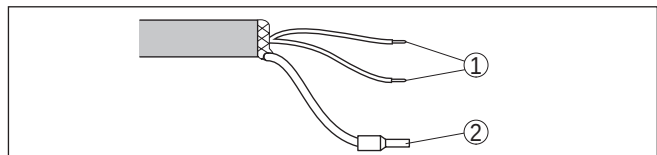


Fig. 18: Wire assignment in permanently connected connection cable

- 1 brown (+) and blue (-) to power supply or to the processing system
- 2 Shielding

5.3 Switch-on phase

After connecting the instrument to power supply or after a voltage recurrence, the instrument carries out a self-check for approx. 30 s:

- Internal check of the electronics
- Indication of the instrument type, hardware and software version, measurement loop name on the display or PC
- Indication of the status message "*F 105 Determine measured value*" on the display or PC
- The output signal jumps to the set fault current

As soon as a plausible measured value is found, the corresponding current is outputted to the signal cable. The value corresponds to the actual level as well as the settings already carried out, e.g. factory setting.

6 Setup

6.1 DD adjustment programs

Device descriptions as Enhanced Device Description (EDD) are available for DD adjustment programs such as, for example, AMS™ and PDM.

The files can be downloaded at www.vega.com/downloads under "Software".

6.2 Adjustment

Since a radar sensor is a distance measuring instrument, the distance from the sensor to the product surface is measured. For indication of the real level, an allocation of the measured distance to the percentage height must be carried out. To perform the adjustment, enter the distance with full and empty vessel, see the following example:

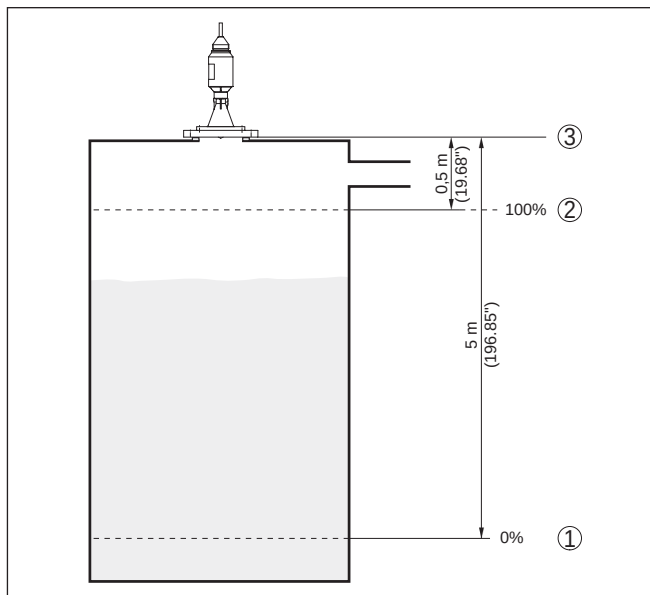


Fig. 19: Parameterization example

- 1 Min. level = max. meas. distance
- 2 Max. level = min. meas. distance

If these values are not known, an adjustment with the distances of for example 10 % and 90 % is possible. Starting point for these distance specifications is always the seal surface of the thread or flange. By means of these settings, the real level will be calculated.

The real product level during this adjustment is not important, because the min./max. adjustment is always carried out without changing the product level. These settings can be made ahead of time without the instrument having to be installed.

7 Diagnosis, asset management and service

7.1 Maintenance

If the device is used correctly, no maintenance is required in normal operation.

7.2 Measured value and event memory

The instrument has several memories which are available for diagnosis purposes. The data remain even with voltage interruption.

Measured value memory

Up to 100,000 measured values can be stored in the sensor in a ring memory. Each entry contains date/time as well as the respective measured value. Storable values are for example:

- Distance
- Filling height
- Percentage value
- Lin. percent
- Scaled
- Current value
- Meas. reliability
- Electronics temperature

When the instrument is shipped, the measured value memory is active and stores distance, measurement certainty and electronics temperature every 3 minutes.

The requested values and recording conditions are set via a PC with PACTware/DTM or the control system with EDD. Data are thus read out and also reset.

Event memory

Up to 500 events are automatically stored with a time stamp in the sensor (non-deletable). Each entry contains date/time, event type, event description and value. Event types are for example:

- Modification of a parameter
- Switch-on and switch-off times
- Status messages (according to NE 107)
- Error messages (according to NE 107)

The data are read out via a PC with PACTware/DTM or the control system with EDD.

Echo curve memory

The echo curves are stored with date and time and the corresponding echo data. The memory is divided into two sections:

Echo curve of the setup: This is used as reference echo curve for the measurement conditions during setup. Changes in the measurement conditions during operation or buildup on the sensor can thus be recognized. The echo curve of the setup is stored via:

- PC with PACTware/DTM
- Control system with EDD
- Display and adjustment module

Further echo curves: Up to 10 echo curves can be stored in a ring buffer in this memory section. Further echo curves are stored via:

- PC with PACTware/DTM
- Control system with EDD

7.3 Asset Management function

The instrument features self-monitoring and diagnostics according to NE 107 and VDI/VDE 2650. In addition to the status messages in the following tables there are more detailed error messages available under the menu item "Diagnostics" via the display and adjustment module, PACTware/DTM and EDD.

Status messages

The status messages are divided into the following categories:

- Failure
- Function check
- Out of specification
- Maintenance requirement

and explained by pictographs:

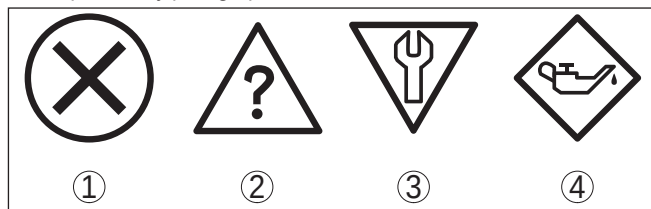


Fig. 20: Pictographs of the status messages

- 1 Failure - red
- 2 Out of specification - yellow
- 3 Function check - orange
- 4 Maintenance - blue

Failure: Due to a malfunction in the instrument, a failure message is outputted.

This status message is always active. It cannot be deactivated by the user.

Function check: The instrument is in operation, the measured value is temporarily invalid (for example during simulation).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Out of specification: The measured value is unstable because the instrument specification is exceeded (e.g. electronics temperature).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Maintenance: Due to external influences, the instrument function is limited. The measurement is affected, but the measured value is still valid. Plan in maintenance for the instrument because a failure is expected in the near future (e.g. due to buildup).

This status message is inactive by default. It can be activated by the user via PACTware/DTM or EDD.

Failure (failure)

The following table shows the codes and text messages in the status message "Failure" and gives information on the reason and rectification. Keep in mind that some specification are only valid for four-wire instruments and the electronics with VEGAPULS WL 61 cannot be exchanged by the user.

Code Text message	Cause	Rectification	PA DevS- pec Diagnosis
F013 no measured value available	– Sensor does not detect an echo during operation – Antenna system contaminated or defective	– Check or correct installation and/or parameter adjustment – Clean or exchange process component or antenna	Bit 0
F017 Adjustment span too small	– Adjustment not within specification	– Change adjustment according to the limit values (difference between min. and max. ≥ 10 mm)	Bit 1
F025 Error in the linearization table	– Index markers are not continuously rising, for example illogical value pairs	– Check linearization table – Delete table/Create new	Bit 2
F036 No operable software	– Failed or interrupted software update	– Repeat software update – Check electronics version – Exchanging the electronics – Send instrument for repair	Bit 3
F040 Error in the electronics	– Hardware defect	– Exchanging the electronics – Send instrument for repair	Bit 4
F080	– General software error	– Disconnect operating voltage briefly	Bit 5
F105 Determine measured value	– The instrument is still in the start phase, the measured value could not yet be determined	– Wait for the end of the switch-on phase – Duration depending on the version and parameter adjustment up to approximately 3 min.	Bit 6
F113 Communication error	– Error in the internal instrument communication	– Disconnect operating voltage briefly – Send instrument for repair	Bit 7

Code Text message	Cause	Rectification	PA DevS- pec Diagnosis
F125 Impermissible electronics temperature	– Temperature of the electronics in the non-specified section	– Check ambient temperature – Isolate electronics – Use instrument with higher temperature range	Bit 8
F260 Error in the calibration	– Error in the calibration carried out in the factory – Error in the EEPROM	– Exchanging the electronics – Send instrument for repair	Bit 9
F261 Error in the configuration	– Error during setup – False signal suppression faulty – Error when carrying out a reset	– Repeat setup – Repeat reset	Bit 10
F264 Installation/Setup error	– Adjustment not within the vessel height/measuring range – Max. measuring range of the instrument not sufficient	– Check or correct installation and/or parameter adjustment – Use an instrument with bigger measuring range	Bit 11
F265 Measurement function disturbed	– Sensor no longer carries out a measurement – Operating voltage too low	– Check operating voltage – Carry out a reset – Disconnect operating voltage briefly	Bit 12

Function check

The following table shows the error codes and text messages in the status message "*Function check*" and provides information on causes as well as corrective measures.

Code Text message	Cause	Rectification
C700 Simulation active	– A simulation is active	– Finish simulation – Wait for the automatic end after 60 mins.

Out of specification

The following table shows the error codes and text messages in the status message "*Out of specification*" and provides information on causes as well as corrective measures.

Code Text mes- sage	Cause	Rectification
S600 Impermissi- ble electronics temperature	– Temperature of the elec- tronics in the non-specified section	– Check ambient temperature – Isolate electronics – Use instrument with higher temperature range
S601 Overfilling	– Danger of vessel overfilling	– Make sure that there is no further filling – Check level in the vessel
S603 Impermissi- ble operating voltage	– Operating voltage below specified range	– Check electrical connection – if necessary, increase operating voltage

Maintenance

The following table shows the error codes and text messages in the status message "Maintenance" and provides information on causes as well as corrective measures.

Code Text mes- sage	Cause	Rectification
M500 Error with the reset delivery status	– With the reset to delivery status, the data could not be restored	– Repeat reset – Load XML file with sensor data into the sensor
M501 Error in the non-active linearization table	– Hardware error EEPROM	– Exchanging the electronics – Send instrument for repair
M502 Error in the diagnosis memory	– Hardware error EEPROM	– Exchanging the electronics – Send instrument for repair
M503 Reliability too low	– The echot/noise ratio is the small for a reliable meas- urement	– Check installation and process conditions – Clean the antenna – Change polarisation direc- tion – Use instrument with higher sensitivity
M504 Error on an device inter- face	– Hardware defect	– Check connections – Exchanging the electronics – Send instrument for repair

Code Text mes- sage	Cause	Rectification
M505 No echo avail- able	– Level echo can no longer be detected	– Clean the antenna – Use a more suitable antenna/sensor – Remove possible false echoes – Optimize sensor position and orientation

7.4 Rectify faults

Reaction when malfunc- tions occur

The operator of the system is responsible for taking suitable meas-
ures to rectify faults.

Procedure for fault recti- fication

The first measures are:

- Evaluation of fault messages, for example via the display and adjustment module
- Checking the output signal
- Treatment of measurement errors

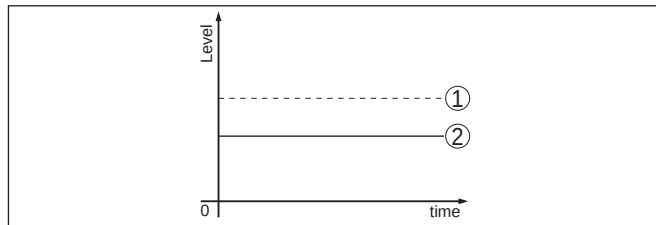
Further comprehensive diagnostics options are available with a PC with PACTware and the suitable DTM. In many cases, the reasons can be determined in this way and faults rectified.

Treatment of measure- ment errors with liquids

The below tables show typical examples of application-related meas-
urement errors with liquids. The measurement errors are differentiated
according to the following:

- Constant level
- Filling
- Emptying

The images in column "*Error pattern*" show the real level with a bro-
ken line and the level displayed by the sensor as a continuous line.



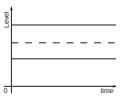
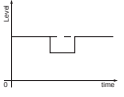
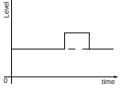
1 Real level

2 Level displayed by the sensor

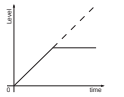
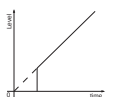
Notes:

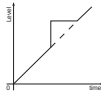
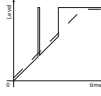
- Wherever the sensor displays a constant value, the reason could also be the fault setting of the current output to "*Hold value*"
- In case of a too low level indication, the reason could be a line resistance that is too high

Measurement error with constant level

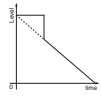
Fault description	Error pattern	Cause	Rectification
1. Measured value shows a too low or too high level		– Min./max. adjustment not correct	– Adapt min./max. adjustment
		– Wrong linearization curve	– Adapt linearization curve
		– Installation in a bypass tube or standpipe, hence running time error (small measurement error close to 100 %/large error close to 0 %)	– Check parameter "Application" with respect to vessel form, adapt if necessary (bypass, standpipe, diameter)
2. Measured value jumps towards 0 %		– Multiple echo (vessel top, product surface) with amplitude higher than the level echo	– Check parameter "Application", especially vessel top, type of medium, dished end, high dielectric constant, adapt if necessary
3. Measured value jumps towards 100 %		– Due to the process, the amplitude of the level echo sinks – A false signal suppression was not carried out	– Carry out a false signal suppression
		– Amplitude or position of a false echo has changed (e.g. condensation, buildup); false signal suppression no longer matches	– Determine the reason for the changed false signals, carry out false signal suppression, e.g. with condensation

Measurement error during filling

Fault description	Error pattern	Cause	Rectification
4. Measured value remains unchanged during filling		– False echoes in the close range too big or level echo too small – Strong foam or spout generation – Max. adjustment not correct	– Eliminate false echoes in the close range – Check measurement situation: Antenna must protrude out of the socket, installations – Remove contamination on the antenna – In case of interferences due to installations in the close range: Change polarisation direction – Create a new false signal suppression – Adapt max. adjustment
5. Measured value remains in the bottom section during filling		– Echo from the tank bottom larger than the level echo, for example, with products with $\epsilon_r < 2.5$ oil-based, solvents	– Check parameters Medium, Vessel height and Floor form, adapt if necessary
6. Measured value remains momentarily unchanged during filling and then jumps to the correct level		– Turbulence on the product surface, quick filling	– Check parameters, change if necessary, e.g. in dosing vessel, reactor

Fault description	Error pattern	Cause	Rectification
7. Measured value jumps towards 0 % during filling		- Amplitude of a multiple echo (vessel top - product surface) is larger than the level echo - The level echo cannot be distinguished from the false echo at a false echo position (jumps to multiple echo)	- Check parameter "Application", especially vessel top, type of medium, dished end, high dielectric constant, adapt if necessary - In case of interferences due to installations in the close range: Change polarisation direction - Chose a more suitable installation position
8. Measured value jumps towards 100 % during filling		Due to strong turbulence and foam generation during filling, the amplitude of the level echo sinks. Measured value jumps to the false echo	Carry out a false signal suppression
9. Measured value jumps sporadically to 100 % during filling		Varying condensation or contamination on the antenna	Carry out a false signal suppression or increase false signal suppression with condensation/contamination in the close range by editing
10. Measured value jumps to ≥ 100 % or 0 m distance		Level echo is no longer detected in the close range due to foam generation or false echoes in the close range. The sensor goes into overfill protection mode. The max. level (0 m distance) as well as the status message "Overfill protection" are outputted.	- Check measuring site: Antenna must protrude out of the socket - Remove contamination on the antenna - Use a sensor with a more suitable antenna

Measurement error during emptying

Fault description	Error pattern	Cause	Rectification
11. Measured value remains unchanged in the close range during emptying		- False echo larger than the level echo - Level echo too small	- Remove false echoes in the close range. Check: Antenna must protrude out of the socket - Remove contamination on the antenna - In case of interferences due to installations in the close range: Change polarisation direction - After removing the false echoes, the false signal suppression must be deleted. Carry out a new false signal suppression
12. Measured value jumps towards 0 % during emptying		Echo from the tank bottom larger than the level echo, for example, with products with $\epsilon_r < 2.5$ oil-based, solvents	Check parameters Type of medium, Vessel height and Floor form, adapt if necessary

Fault description	Error pattern	Cause	Rectification
13. Measured value jumps sporadically towards 100 % during emptying		Varying condensation or contamination on the antenna	- Carry out false signal suppression or increase false signal suppression in the close range by editing - With bulk solids, use radar sensor with purging air connection

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "Setup" must be carried out again or must be checked for plausibility and completeness.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is also available outside normal working hours, seven days a week around the clock.

Since we offer this service worldwide, the support is provided in English. The service itself is free of charge, the only costs involved are the normal call charges.

7.5 How to proceed if a repair is needed

You can find a repair form as well as detailed information on how to proceed at www.vega.com/downloads and "Forms and certificates".

By doing this you help us carry out the repair quickly and without having to call back for needed information.

If a repair is necessary, please proceed as follows:

- Print and fill out one form per instrument
- Clean the instrument and pack it damage-proof
- Attach the completed form and, if need be, also a safety data sheet outside on the packaging
- Please contact the agency serving you to get the address for the return shipment. You can find the agency on our home page www.vega.com.

8 Dismount

8.1 Dismounting steps

**Warning:**

Before dismantling, be aware of dangerous process conditions such as e.g. pressure in the vessel or pipeline, high temperatures, corrosive or toxic products etc.

Take note of chapters "*Mounting*" and "*Connecting to power supply*" and carry out the listed steps in reverse order.

8.2 Disposal

The instrument consists of materials which can be recycled by specialised recycling companies. We use recyclable materials and have designed the parts to be easily separable.

Correct disposal avoids negative effects on humans and the environment and ensures recycling of useful raw materials.

Materials: see chapter "*Technical data*"

If you have no way to dispose of the old instrument properly, please contact us concerning return and disposal.

WEEE directive 2002/96/EG

This instrument is not subject to the WEEE directive 2002/96/EG and the respective national laws. Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points. These may be used only for privately used products according to the WEEE directive.

9 Supplement

9.1 Technical data

General data

Materials, wetted parts

– Adapter flange	PP
– Seal, adapter flange	FKM (COG VI500), EPDM (COG AP310)
– Antenna	PBT-GF 30
– Focussing lense	PP

Materials, non-wetted parts

– Compression flange	PP
– Mounting strap	316L
– Fixing screws, mounting strap	316L
– Fixing screws, adapter flange	304
– Housing	plastic PBT (Polyester)
– type label support on cable	PE hard

Process fitting, mounting thread on the housing

– Flange	DIN from DN 80, ASME from 3", JIS from DN 100 10K
– Pipe thread, cylindrical (ISO 228 T1)	G1½

Instrument weight, depending on process fitting 0.7 ... 3.4 kg (1.543 ... 7.496 lbs)

Weight suspension cable 0.1 kg/m (0.07 lbs/ft)

Max. torque for mounting strap on sensor housing 4 Nm

Max. torque flange screws

– Compression flange DN 80	5 Nm (3.689 lbf ft)
– Adapter flange DN 100	7 Nm (5.163 lbf ft)

Input variable

Measured variable The measured variable is the distance between the process fitting of the sensor and the product surface. The reference plane is the lower side of the flange.

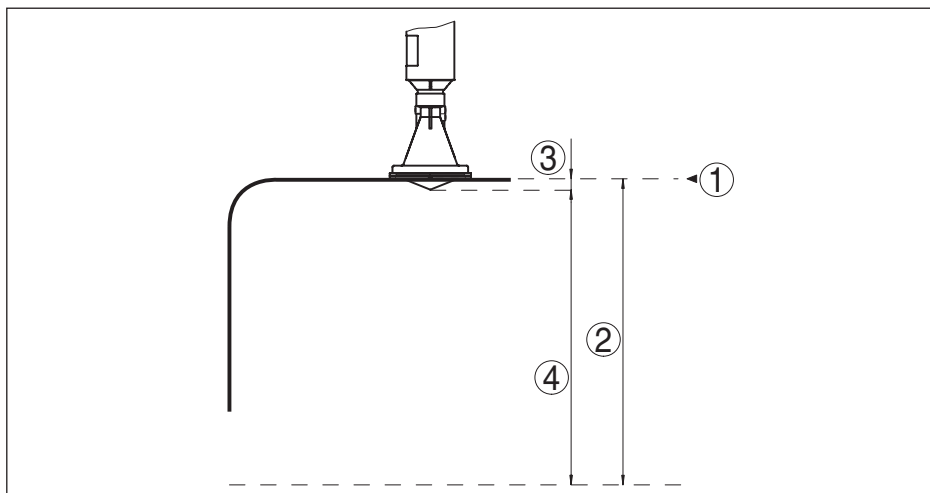


Fig. 35: Data of the input variable

- 1 Reference plane
- 2 Measured variable, max. measuring range
- 3 Antenna length
- 4 Useful measuring range

Max. measuring range 15 m (49.21 ft)

Output variable

Output signal	digital output signal, format according to IEEE-754
Sensor address	126 (default setting)
Damping (63 % of the input variable)	0 ... 999 s, adjustable
Profibus PA profile	3.02
Number of FBs with AI (function blocks with analogue input)	3
Default values	
– 1. FB	PV
– 2. FB	SV 1
– 3. FB	SV 2
Current value	
– Non-Ex and Ex ia instrument	10 mA, ± 0.5 mA
– Ex-d instruments	16 mA, ± 0.5 mA
Resolution, digital	< 1 mm (0.039 in)

Accuracy (according to DIN EN 60770-1)

Process reference conditions according to DIN EN 61298-1	
– Temperature	+18 ... +30 °C (+64 ... +86 °F)
– Relative humidity	45 ... 75 %

– Air pressure	860 ... 1060 mbar/86 ... 106 kPa (12.5 ... 15.4 psig)
Installation reference conditions	
– Min. distance to installations	> 200 mm (7.874 in)
– Reflector	Plane plate reflector
– False reflections	Biggest false signal, 20 dB smaller than the useful signal
Deviation with liquids	See following diagrams

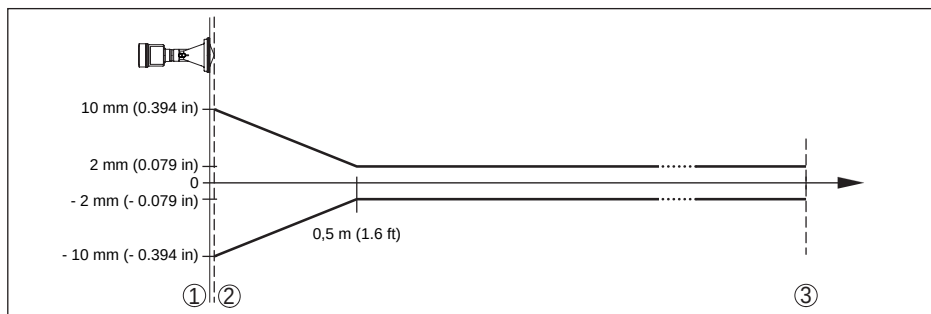


Fig. 36: Deviation under reference conditions

- 1 Reference plane
- 2 Antenna edge
- 3 Recommended measuring range

Repeatability $\leq \pm 1$ mm

Variables influencing measurement accuracy

Temperature drift - Digital output ± 3 mm/10 K relating to the max. measuring range or max. 10 mm

Additional deviation through electromagnetic interference acc. to EN 61326 $< \pm 50$ mm

Characteristics and performance data

Measuring frequency K-band (26 GHz technology)

Measuring cycle time approx. 450 ms

Step response time¹⁾ ≤ 3 s

Beam angle²⁾ 10°

Emitted HF power³⁾

- Average spectral transmission power density -34 dBm/MHz EIRP
- Max. spectral transmission power density +6 dBm/50 MHz EIRP
- Max. power density in a distance of 1 m $< 1 \mu\text{W}/\text{cm}^2$

¹⁾ Time span after a sudden distance change of max. 0.5 m until the output signal reaches for the first time 90% of the final value (IEC 61298-2).

²⁾ Outside the specified beam angle, the energy of the radar signal has a level which is reduced by 50 % (-3 dB)

³⁾ EIRP: Equivalent Isotropic Radiated Power

Ambient conditions

Ambient, storage and transport temperature -40 ... +80 °C (-40 ... +176 °F)

Process conditions

For the process conditions, please also note the specifications on the type label. The lower value always applies.

Vessel pressure	-1 ... 2 bar (-100 ... 200 kPa/-14.5 ... 29.0 psig)
Process temperature (measured on the process fitting)	-40 ... +80 °C (-40 ... +176 °F)
Vibration resistance	
– With adapter flange	2 g at 5 ... 200 Hz according to EN 60068-2-6 (vibration with resonance)
– with mounting strap	1 g at 5 ... 200 Hz according to EN 60068-2-6 (vibration with resonance)
Shock resistance	100 g, 6 ms according to EN 60068-2-27 (mechanical shock)

Electromechanical data - version IP 66/IP 68 (2 bar)

Cable entry	IP 68 cable gland
Connection cable	
– Configuration	two wires, one Kevlar cable, braiding, cover
– Wire cross-section	0.5 mm ² (AWG 20)
– Standard length	6 m (19.69 ft)
– Max. length	550 m (1804 ft)
– Min. bending radius	25 mm (0.984 in) with 25 °C (77 °F)
– Diameter approx.	8 mm (0.315 in)
– Wire isolating and cable cover	PUR
– Colour - standard	Black
– Colour - Ex-version	Blue
– Fire protection classification	UL94-V0

Integrated clock

Date format	Day.Month.Year
Time format	12 h/24 h
Time zone Ex factory	CET
Rate deviation max.	10.5 min/year

Measurement electronics temperature

Resolution	0.1 °C (1.8 °F)
Accuracy	±1 °C (1.8 °F)
Permissible temperature range	-40 ... +85 °C (-40 ... +185 °F)

Voltage supply

Operating voltage

- Non-Ex instrument 9 ... 32 V DC
- Ex-ia instrument - Power supply FISCO model 9 ... 17.5 V DC
- Ex-ia instrument - Power supply ENTITY model 9 ... 24 V DC

Power supply by/max. number of sensors

- DP/PA segment coupler max. 32 (max. 10 with Ex)
- VEGALOG 571 EP card max. 15 (max. 10 with Ex)

Electrical protective measures

Protection rating	IP 66/IP 68 (2 bar), NEMA 6P
Overvoltage category	III ⁴⁾
Protection class	III ⁵⁾

Approvals

Instruments with approvals can have different technical specifications depending on the version.

For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com, "VEGA Tools" and "Instrument search" as well as under www.vega.com/downloads and "Approvals".

9.2 Radio astronomy stations

The following table shows the geographic position of the radio astronomy stations in Europe:

Country	Name of the Station	Geographic Latitude	Geographic Longitude
Finland	Metsähovi	60°13'04" N	24°23'37" E
	Tuorla	60°24'56" N	24°26'31" E
France	Plateau de Bure	44°38'01" N	05°54'26" E
	Floirac	44°50'10" N	00°31'37" W
Germany	Effelsberg	50°31'32" N	06°53'00" E
Hungary	Penc	47°47'22" N	19°16'53" E
Italy	Medicina	44°31'14" N	11°38'49" E
	Noto	36°52'34" N	14°59'21" E
	Sardinia	39°29'50" N	09°14'40" E
Poland	Krakow- Fort Skala	50°03'18" N	19°49'36" E
Russia	Dmitrov	56°26'00" N	37°27'00" E
	Kalyazin	57°13'22" N	37°54'01" E
	Pushchino	54°49'00" N	37°40'00" E
	Zelenchukskaya	43°49'53" N	41°35'32" E

⁴⁾ IEC 61010-1

⁵⁾ IEC 61010-1

Country	Name of the Station	Geographic Latitude	Geographic Longitude
Spain	Yebes	40°31'27" N	03°05'22" W
	Robledo	40°25'38" N	04°14'57" W
Switzerland	Bleien	47°20'26" N	08°06'44" E
Sweden	Onsala	57°23'45" N	11°55'35" E
UK	Cambridge	52°09'59" N	00°02'20" E
	Darnhall	53°09'22" N	02°32'03" W
	Jodrell Bank	53°14'10" N	02°18'26" W
	Knockin	52°47'24" N	02°59'45" W
	Pickmere	53°17'18" N	02°26'38" W

9.3 Communication Profibus PA

Instrument master file

The instrument master file (GSD) contains the characteristic data of the Profibus PA instrument. These data are, e.g. the permissible transmission rates as well as information on diagnostics values and the format of the measured value outputted by the PA instrument.

A bitmap file is also provided for the Profibus network planning tool. This file is installed automatically when the GSD file is integrated. The bitmap file is used for symbolic indication of the PA instrument in the configuration tool.

ID number

Each Profibus instrument gets an unambiguous ident number (ID number) from the Profibus user organisation (PNO). This ID number is also included in the name of the GSD file. Optionally to this manufacturer-specific GSD file, PNO provides also a general so-called profile-specific GSD file. If the general GSD file is used, the sensor must be set to the profile-specific ident number via the DTM software. By default, the sensor operates with the manufacturer-specific ID number. When using the instruments on a segment coupler SK-2 or SK-3, no special GSD files are required.

The following table shows the instrument ID and the GSD file names for VEGAPULS radar sensors.

Device name	Instrument ID		GSD file name	
	VEGA	Instrument class in profile 3.02	VEGA	Profile-specific
VEGAPULS WL 61	0x0CDB	0x9702	PS61WL0CDB.GSD	PA139702.GSD
VEGAPULS 61	0x0BFC	0x9702	PS610BFC.GSD	PA139702.GSD
VEGAPULS 62	0x0BFD	0x9702	PS620BFD.GSD	PA139702.GSD
VEGAPULS 63	0x0BFE	0x9702	PS630BFE.GSD	PA139702.GSD
VEGAPULS 65	0x0BFF	0x9702	PS650BFF.GSD	PA139702.GSD
VEGAPULS 66	0x0C00	0x9702	PS660C00.GSD	PA139702.GSD
VEGAPULS 67	0x0C01	0x9702	PS670C01.GSD	PA139702.GSD
VEGAPULS SR 68	0x0CDC	0x9702	PS68R0CDC.GSD	PA139702.GSD
VEGAPULS 68	0x0C02	0x9702	PS680C02.GSD	PA139702.GSD

Cyclical data traffic

The master class 1 (e.g. PLC) cyclically reads out measured values from the sensor during operation. The below block diagram below shows which data can be accessed by the PLC.

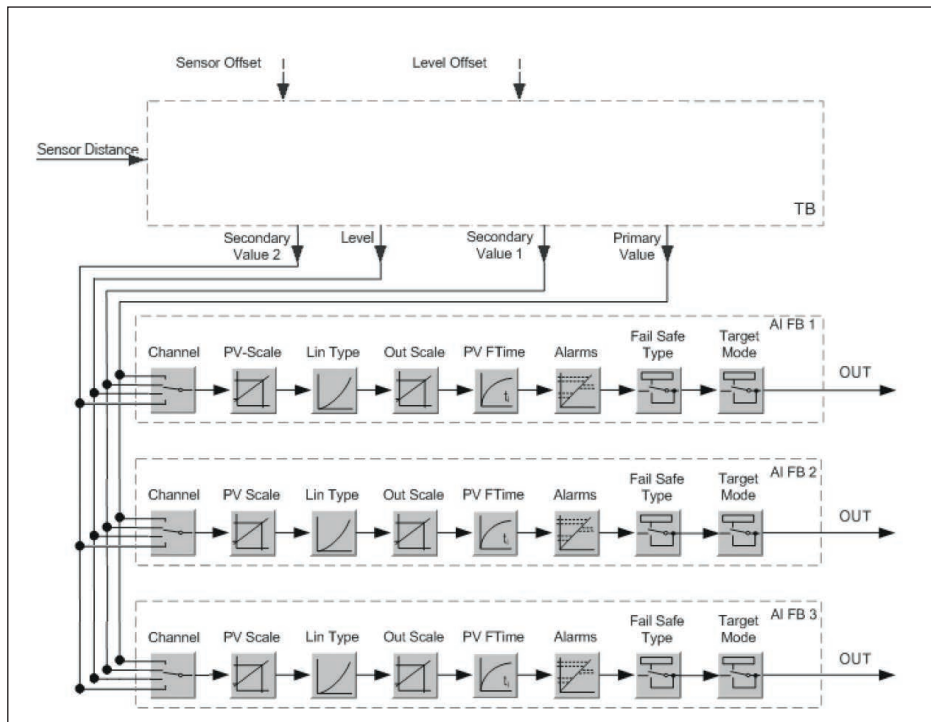


Fig. 37: VEGAPULS WL 61: Block diagram with AI FB 1 ... AI FB 3 OUT values

TB Transducer Block

FB 1 ... FB 3

Function Block

Module of the PA sensors

For the cyclic data traffic, VEGAPULS WL 61 provides the following modules:

- AI FB1 (OUT)
 - Out value of the AI FB1 after scaling
- AI FB2 (OUT)
 - Out value of the AI FB2 after scaling
- AI FB3 (OUT)
 - Out value of the AI FB3 after scaling
- Free Place
 - This module must be used if a value in the data telegram of the cyclical data traffic should not be used (e.g. replacement of temperature and Additional Cyclic Value)

A maximum of three modules can be active. By means of the configuration software of the Profibus master you can determine the configuration of the cyclical data telegram with these modules. The procedure depends on the respective configuration software.



Note:

The modules are available in two versions:

- Short for Profibus master supporting only one "Identifier Format" byte, e.g. Allen Bradley
- Long for Profibus master only supporting the "Identifier Format" byte, e.g. Siemens S7-300/400

Examples of telegram configuration

In the following you will see how the modules can be combined and how the appendant data telegram is structured.

Example 1

- AI FB1 (OUT)
- AI FB2 (OUT)
- AI FB3 (OUT)

Byte-No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Format	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status	IEEE-754-Floating point value				Status
Value	AI FB1 (OUT)				AI FB1	AI FB2 (OUT)				AI FB2	AI FB3 (OUT)				AI FB3

Example 2

- AI FB1 (OUT)
- Free Place
- Free Place

Byte-No.	1	2	3	4	5
Format	IEEE-754-Floating point value				Status
Value	AI FB1 (OUT)				AI FB1



Note:

Bytes 6-15 are not used in this example.

Data format of the output signal

Byte4	Byte3	Byte2	Byte1	Byte0
Status	Value (IEEE-754)			

Fig. 38: Data format of the output signal

The status byte corresponds to profile 3.02 "Profibus PA Profile for Process Control Devices" coded. The status "Measured value OK" is coded as 80 (hex) (Bit7 = 1, Bit6 ... 0 = 0).

The measured value is transferred as a 32 bit floating point number in the IEEE-754 format.

Byte n								Byte n+1								Byte n+2								Byte n+3							
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
VZ	2 ⁷	2 ⁶	2 ⁵	2 ⁴	2 ³	2 ²	2 ¹	2 ⁰	2 ⁻¹	2 ⁻²	2 ⁻³	2 ⁻⁴	2 ⁻⁵	2 ⁻⁶	2 ⁻⁷	2 ⁻⁸	2 ⁻⁹	2 ⁻¹⁰	2 ⁻¹¹	2 ⁻¹²	2 ⁻¹³	2 ⁻¹⁴	2 ⁻¹⁵	2 ⁻¹⁶	2 ⁻¹⁷	2 ⁻¹⁸	2 ⁻¹⁹	2 ⁻²⁰	2 ⁻²¹	2 ⁻²²	2 ⁻²³
Sign Bit	Exponent							Significant								Significant								Significant							

$$\text{Value} = (-1)^{\text{VZ}} \cdot 2^{(\text{Exponent} - 127)} \cdot (1 + \text{Significant})$$

Fig. 39: Data format of the measured value

Coding of the status byte associated with the PA output value

You can find further information for the coding of the status byte in the Device Description 3.02 on www.profibus.com.

Status code	Description according to Profibus standard	Possible cause
0 x 00	bad - non-specific	Flash-Update active
0 x 04	bad - configuration error	- Adjustment error - Configuration error with PV-Scale (PV-Span too small) - Unit irregularity - Error in the linearization table
0 x 0C	bad - sensor failure	- Hardware error - Converter error - Leakage pulse error - Trigger error
0 x 10	bad - sensor failure	- Measured value generation error - Temperature measurement error
0 x 1f	bad - out of service constant	"Out of Service" mode switched on
0 x 44	uncertain - last unstable value	Failsafe replacement value (Failsafe-Mode = "Last value" and already valid measured value since switching on)
0 x 48	uncertain substitute set	- Switch on simulation - Failsafe replacement value (Failsafe-Mode = "Fsafe value")
0 x 4c	uncertain - initial value	Failsafe replacement value (Failsafe-Mode = "Last valid value" and no valid measured value since switching on)
0 x 51	uncertain - sensor; conversion not accurate - low limited	Sensor value < lower limit
0 x 52	uncertain - sensor; conversion not accurate - high limited	Sensor value > upper limit
0 x 80	good (non-cascade) - OK	OK
0 x 84	good (non-cascade) - active block alarm	Static revision (FB, TB) changed (10 sec. active, after the parameter of the static category has been written)

Status code	Description according to Profibus standard	Possible cause
0 x 89	good (non-cascade) - active advisory alarm - low limited	Lo-Alarm
0 x 8a	good (non-cascade) - active advisory alarm - high limited	Hi-Alarm
0 x 8d	good (non-cascade) - active critical alarm - low limited	Lo-Lo-Alarm
0 x 8e	good (non-cascade) - active critical alarm - high limited	Hi-Hi-Alarm

9.4 Dimensions

The following dimensional drawings represent only an extract of all possible versions. Detailed dimensional drawings can be downloaded at www.vega.com/downloads under "Drawings".

VEGAPULS WL 61, basic version

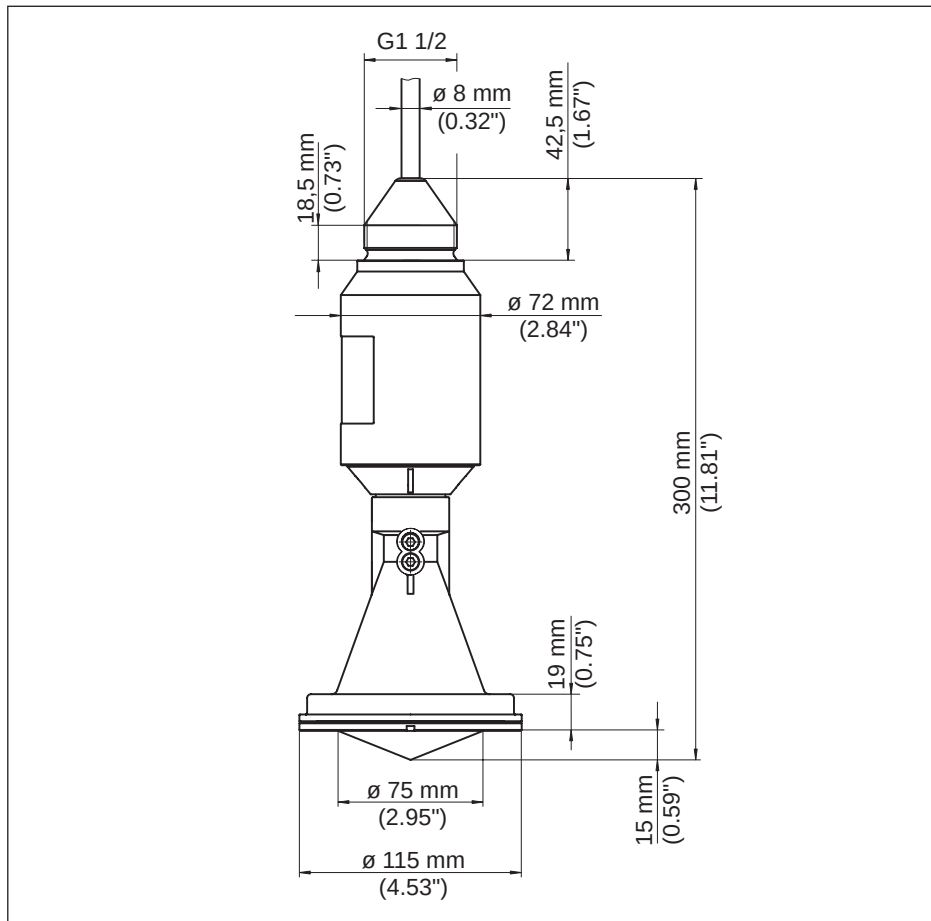


Fig. 40: VEGAPULS WL 61, basic version

VEGAPULS WL 61, version with mounting strap

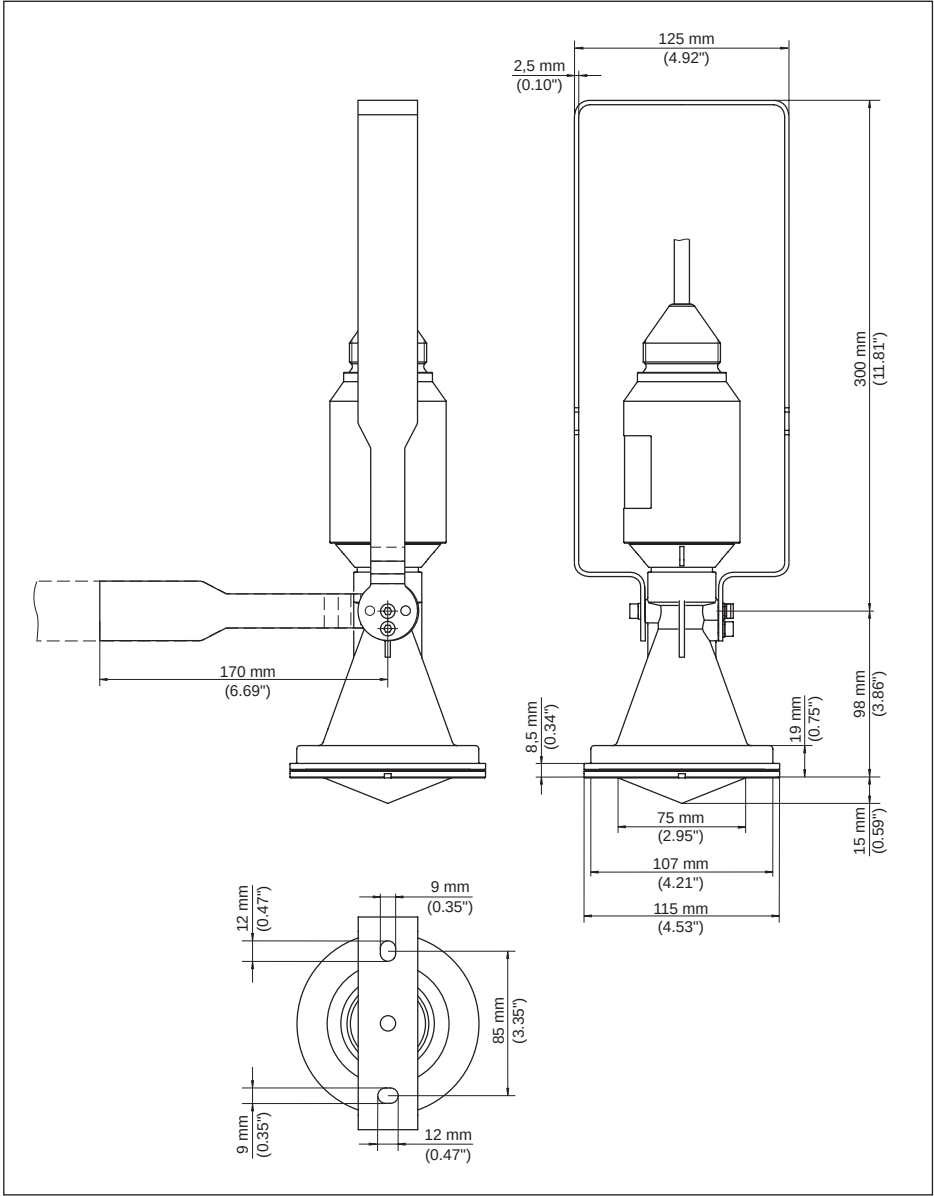


Fig. 41: VEGAPULS WL 61, version with mounting strap in 170 or 300 mm length

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VEGAPULS WL 61, version with compression flange

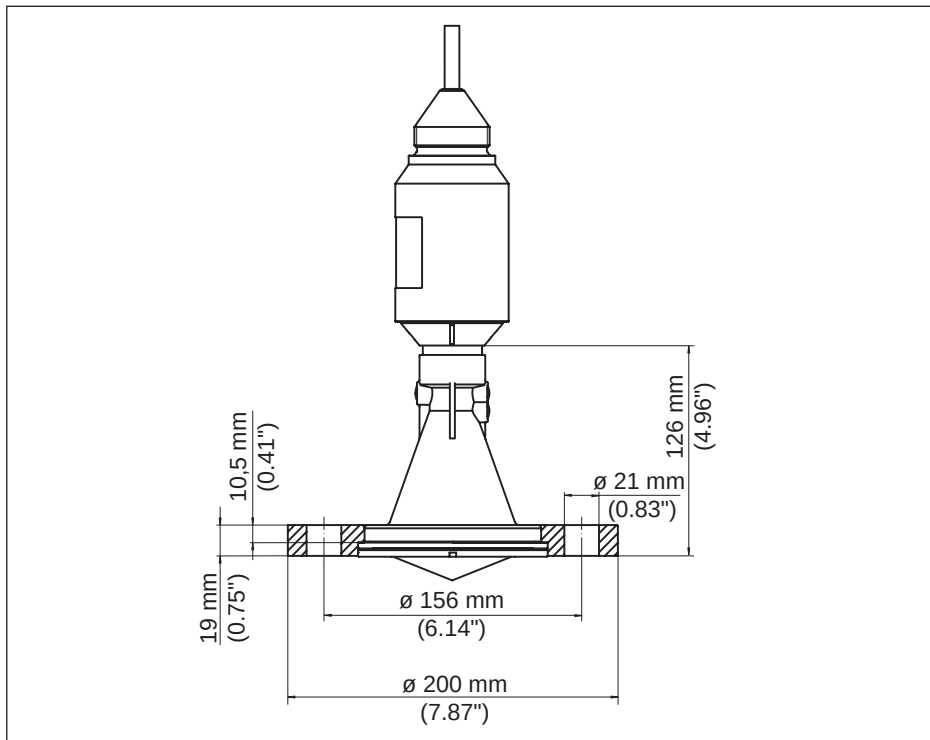


Fig. 42: VEGAPULS WL 61, compression flange DN 80/3"/JIS80

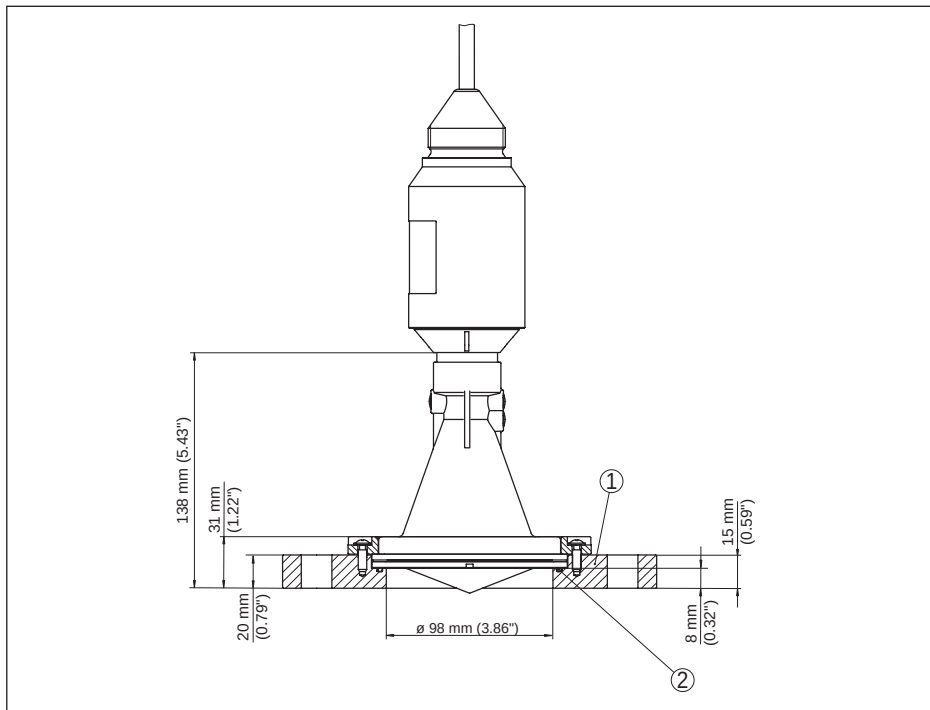
VEGAPULS WL 61, version with adapter flange

Fig. 43: VEGAPULS WL 61, adapter flange DN 100/4"/JIS 100 as well as DN 150/6"/JIS 150

- 1 Adapter flange
- 2 Seal

9.5 Industrial property rights

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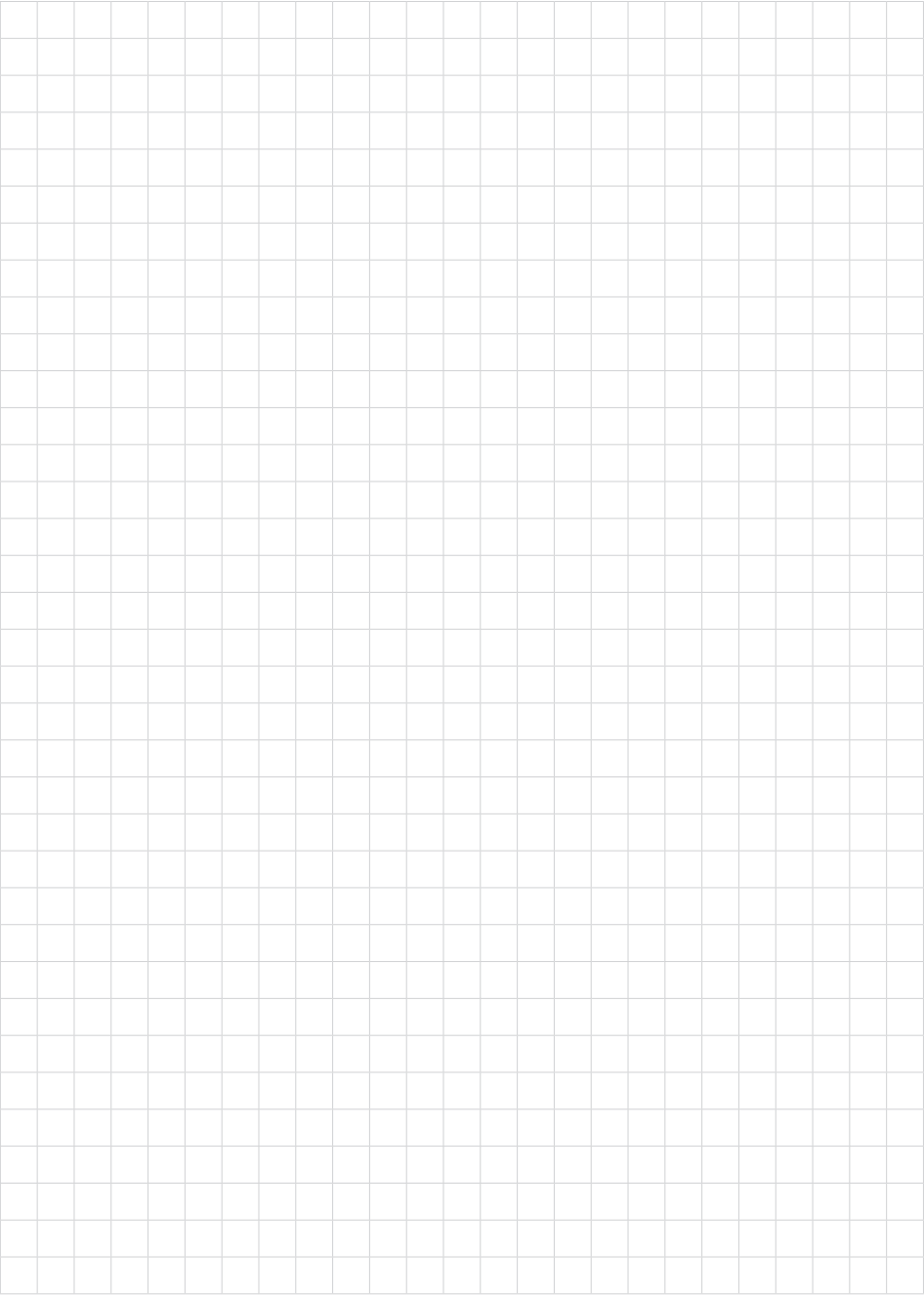
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All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.

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